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#### (54) DEVICE FOR EXPANDING TUBES

#### (57) Abstract:

FIELD: drilling and overhauling of oil and gas oil wells. SUBSTANCE: installed on inclined journal of body 1 for rotation is mandrel 2. Outer surface of mandrel 2 is formed by conjugated to each other alternating parts of surface of ball 3 and side surfaces 4 of cylinders whose axes are located in plane square to axis of mandrel 2. After lowering of unit 9 into well 10 and its straightening with inner pressure of fluid nonstraightened corrugations remain over its edges. Device is screwed on drill pipes and run into well 10. In this case, mandrel owing to its streamline shape of working surface enters unit 9. During rotation of drill pipes, mandrel 2 straightness profiled unit 9 tightly rolling it to well 10. Built-up on walls of unit 9 and corrugation is higher specific pressure, friction is considerably reduced and decreased wear of walls of unit 9. EFFECT: increased speed and quality of expanding and simplified device manufacture process. 4 dwg

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(56) References cited:

Авторское свидетельство СССР N E 21B 29/00, 1975. Авторское свидетельство СССР N 851836, кл. B 21D 39/14, 1979.

(71) Applicant: Татарский государственный научно-исследовательский и проектный институт нефтяной промышленности. Специальное конструкторское бюро по долотам Производственного объединения "Куйбышевбурмаш"

(72) Inventor: Мельниг К.В., Сафонов Ю.А., Абдрахманов Г.С., Михайлин Ю.Г., Богомолов Р.М., Саломатин В.В., Мухаметшин А.А., Мингазов С.М.,

(54) УСТРОЙСТВО ДЛЯ РАЗВАЛЬЦОВКИ ТРУБ

(57) Abstract:

Изобретение относится к области бурения и капитального ремонта нефтяных и газовых скважин и позволяет увеличить скорость и качество развальцовки и упростить технологию изготовления устр-ва. На корпус 1 устр-ва наклонной цапfe установлена с возможностью вращения оправка 2. Наружная поверхность оправки 2 образована сопряженными между собой чередующимися участками поверхности шара 3 и боковыми поверхностями 4 цилиндров, оси которых расположены в перпендикулярной к оси оправки 2 плоскости. После спуска перекрывателя (П) 9 в скважину 10 и выправления его внутренним давлением жидкости по его периметру остаются невыправленные гофры. Устр-во соединяют с буровыми трубами и опускают в скважину 10. При этом оправка 2 благодаря обтекаемой форме рабочей поверхности входит внутрь П 9. При вращении буровых труб оправка 2 выправляет профильный П 9, плотно прикатывая его к скважине 10. На стенках П 9 и гофр создается более высокое удельное давление, значительно снижается трение и уменьшается износ стенок П 9. 4 ил.

## Description [Описание изобретения]:

Изобретение относится к области бурения и капитального ремонта нефтяных и газовых скважин и предназначено, в частности, для развальцовки профильных перекрывателей, установленных в скважине.

Целью изобретения является повышение скорости и качества развальцовки, упрощение технологии изготовления устройства.

На фиг.1 изображено предлагаемое устройство при развальцовке перекрывателя в обсадной колонне, общий вид; на фиг.2 - вид В на фиг.1 (на оправку устройства); на фиг. 3 - сечение А-А на фиг.1; на фиг.4 - сечение Б-Б на фиг.1.

Устройству для развальцовки труб (см.фиг.1) состоит из корпуса 1 и оправки 2. Оправка установлена на наклонной цапфе с помощью двух рядов шарикоподшипников (на фиг.1 не показаны), один из которых является замковым.

Наружная рабочая поверхность оправки (см.фиг.2) выполнена в виде сопряжения поверхности шара 3 с цилиндрическими поверхностями 4, оси 5 которых расположены в перпендикулярной к продольной оси 6 оправки плоскости (под углом  $90^\circ$ ). При этом оси 5 проходят через центр 0 шара, а общая точка 7 пересечения поверхностей 4 расположена на вершине оправки 2.

Плавность сопряжения 8 поверхностей 3 и 4 достигается посредством закругления инструмента (резца) радиусом R при вытачивании оправки на токарном станке.

Возможно несколько вариантов выполнения оправки: а) со смещением осей 5 на некоторое расстояние от оси 6 вальцовки в перпендикулярной к ней плоскости; б) со смещением плоскости, в которой расположены оси 5, ниже центра 0 оправки; в) цилиндрических поверхностей 4 вогнутых (гиперболических) поверхностей вращения.

Устройство работает следующим образом.

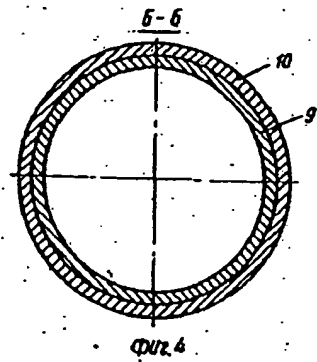
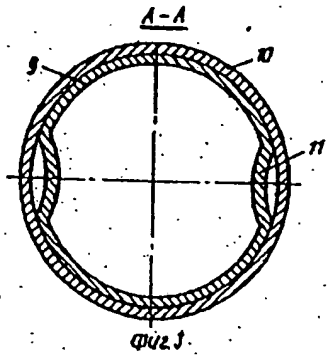
После спуска перекрывателя 9 (см.фиг.1 и 3) в скважину или колонну 10 и выправления его внутренним давлением жидкости по его периметру остаются невыправленные гофры 11 вследствие упругости материала (см.фиг.3). Устройство свинчивают с буровыми трубами 12 и спускают в скважину 10, при этом оправка 2 благодаря обтекаемой форме рабочей поверхности входит внутрь перекрывателя 9 и при вращении буровых труб 12 выправляет профильный перекрыватель 9, плотно прижимая его к колонне 10 (см.фиг.4). Благодаря форме наружной поверхности оправки, переходов 8 и сегментных ребер (поверхность шара 3) на стенке трубы 9 и гофр 11 создается более высокое удельное давление, значительно снижается трение и уменьшается износ стенок трубы 9, вследствие чего увеличивается скорость и качество развальцовки.

Claims [Формула изобретения]:

УСТРОЙСТВО ДЛЯ РАЗВАЛЬЦОВКИ ТРУБ, содержащее корпус и установленную на нем наклонной цапфе с возможностью вращения оправки, наружная поверхность которой образована сопряженными между собой чередующимися участками поверхности шара и фигурными поверхностями, отличающееся тем, что, с целью увеличения скорости и качества развальцовки и упрощения технологии изготовления устройства, фигурные поверхности образованы боковыми поверхностями цилиндров, оси которых расположены в перпендикулярной к оси оправки плоскости.



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(71) Applicant: Tatar State Scientific-Research and Planning Institute of the Petroleum Industry. Special Design Bureau for Drilling Bits of the Kuybyshevburmash Production Association

(72) Inventors: K. V. Meling, Yu. A. Safonov, G. S. Abdrakhmanov, Yu. G. Mikhaylin, R. M. Bogomolov, V. V. Salomatin, A. A. Mukhametshin, and S. M. Mingazov

[English abstract and title provided in original, *sic*] [see p. 2 for translation of Russian abstract and title]

(54) DEVICE FOR EXPANDING TUBES

(57) Abstract:

FIELD: drilling and overhauling of oil and gas oil wells. SUBSTANCE: installed on inclined journal of body 1 for rotation is mandrel 2. Outer surface of mandrel 2 is formed by conjugated to each other alternating parts of surface of ball 3 and side surfaces 4 of cylinders whose axes are located in plane square to axis of mandrel 2. After lowering of unit 9 into well 10 and its straightening with inner pressure of fluid nonstraightened corrugations remain over its edges. Device is screwed on drill pipes and run into well 10. In this case, mandrel owing to its streamline shape of working surface enters unit 9. During rotation of drill pipes, mandrel 2 straightness profiled unit 9 tightly rolling it to well 10. Built-up on walls of unit 9 and corrugation is higher specific pressure, friction is considerably reduced and decreased wear of walls of unit 9. EFFECT: increased speed and quality of expanding and simplified device manufacture process. 4 dwg

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(54) A DEVICE FOR EXPANDING PIPES

(57) Abstract:

The invention relates to the field of drilling and major repairs of oil and gas wells, and makes it possible to increase expanding speed and quality and to simplify the fabrication technology for the device. On body 1 of the device, mandrel 2 is mounted on an inclined journal so that it can rotate. The outer surface of mandrel 2 is formed by joined alternating sections of the surface of sphere 3 and the lateral surfaces 4 of cylinders, for which the axes are located in the plane perpendicular to the axis of mandrel 2. After sealing assembly 9 has been lowered into well 10 and it has been straightened by internal pressure of a fluid along its perimeter, unstraightened corrugations remain. The device is screwed together with drill pipes and lowered into well 10. Because of the streamlined shape of the working surface, mandrel 2 then fits inside sealing assembly 9. When the drill pipes rotate, mandrel 2 straightens out the shaped sealing assembly 9, tightly rolling it against well 10. A higher unit pressure is also created on the walls of sealing assembly 9 and the corrugations, friction is significantly reduced, and wear is reduced for the walls of sealing assembly 9. 4 drawings.



Description:

The invention relates to the field of drilling and major repairs of oil and gas wells, and is designed in particular for expanding shaped sealing assemblies placed downhole.

The aim of the invention is to improve expanding speed and quality and to simplify the fabrication technology for the device.

Fig. 1 shows a general view of the proposed device during expanding of a sealing assembly in a casing; Fig. 2 shows the C view in Fig. 1 (toward the mandrel of the device); Fig. 3 shows the A—A cross section in Fig. 1; Fig. 4 shows the B—B cross section in Fig. 1.

The device for expanding pipes (see Fig. 1) consists of body 1 and mandrel 2. The mandrel is mounted on an inclined journal using two rows of ball bearings (not shown in Fig. 1), one of which is locking.

The outer working surface of the mandrel (see Fig. 2) is implemented as joining of the surface of sphere 3 with cylindrical surfaces 4, the axes 5 of which are located in the plane perpendicular to longitudinal axis 6 of the mandrel (at a  $90^\circ$  angle). Here axes 5 pass through the center 0 of the sphere, and the common intersection point 7 of surfaces 4 is located at the high point of mandrel 2.

Smoothness of the joining 8 of surfaces 3 and 4 is achieved by means of the curvature of the tool (cutter) with radius R while the mandrel is being turned on a lathe.

Several embodiments of the mandrel are possible: a) with offset of axes 5 by some distance from axis 6 of the roller in the plane perpendicular thereto; b) with offset of the plane in which axes 5 are located to a position below the center 0 of the mandrel; c) cylindrical surfaces 4 as concave (hyperbolic) surfaces of revolution.

The device works as follows.

After sealing assembly 9 (see Figs. 1 and 3) is lowered into the well or into string 10 and it has been straightened out by internal pressure of a fluid along its perimeter, unstraightened corrugations 11 remain due to the elasticity of the material (see Fig. 3). The device is screwed together with drill pipes 12 and lowered into well 10, where mandrel 2, because of the streamlined shape of the working surface, fits inside sealing assembly 9, and when drill pipes 12 rotate, it straightens shaped sealing assembly 9, tightly squeezing it against string 10 (see Fig. 4). Because of the shape of the outer surface of the mandrel, transition surfaces 8 and segmented ribs (the surface of sphere 3), a higher unit pressure is created on the wall of pipe 9 and corrugations 11, friction is significantly reduced, and wear is reduced for the walls of pipe 9, and as a result the expanding speed and quality are improved.

Claim:

A DEVICE FOR EXPANDING PIPES, containing a body and a mandrel, mounted on the body on an inclined journal so that it can rotate and with an outer surface formed by joined alternating sections of the surface of a sphere and shaped surfaces, distinguished by the fact that, with the aim of improving the expanding speed and quality and simplifying the fabrication technology for the device, the shaped surfaces are formed by the lateral surfaces of cylinders, the axes of which are located in the plane perpendicular to the axis of the mandrel.

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Drawing(s):

[see Russian original for figure]

B B  
A A  
C

Fig. 1

[see Russian original for figure]

C view

Fig. 2

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[see Russian original for figure]

A—A

Fig. 3

[see Russian original for figure]

B—B

Fig. 4



TRANSPERFECT | TRANSLATIONS

### AFFIDAVIT OF ACCURACY

I, Kim Stewart, hereby certify that the following is, to the best of my knowledge and belief, true and accurate translations performed by professional translators of the following Patents and Abstracts from Russian to English:

ATLANTA	<i>Patent 1786241 A1</i>
BOSTON	<i>Patent 989038</i>
BRUSSELS	<i>Abstract 976019</i>
CHICAGO	<i>Patent 959878</i>
DALLAS	<i>Abstract 909114</i>
DETROIT	<i>Patent 907220</i>
FRANKFURT	<i>Patent 894169</i>
HOUSTON	<i>Patent 1041671 A</i>
LONDON	<i>Patent 1804543 A3</i>
LOS ANGELES	<i>Patent 1686123 A1</i>
MIAMI	<i>Patent 1677225 A1</i>
MINNEAPOLIS	<i>Patent 1698413 A1</i>
NEW YORK	<i>Patent 1432190 A1</i>
PARIS	<i>Patent 1430498 A1</i>
PHILADELPHIA	<i>Patent 1250637 A1</i>
SAN DIEGO	<i>Patent 1051222 A</i>
SAN FRANCISCO	<i>Patent 1086118 A</i>
SEATTLE	<i>Patent 1749267 A1</i>
WASHINGTON, DC	<i>Patent 1730429 A1</i>
	<i>Patent 1686125 A1</i>
	<i>Patent 1677248 A1</i>
	<i>Patent 1663180 A1</i>
	<i>Patent 1663179 A2</i>
	<i>Patent 1601330 A1</i>
	<i>Patent SU 1295799 A1</i>
	<i>Patent 1002514</i>

PAGE 2

**AFFIDAVIT CONTINUED**

(Russian to English Patent/Abstract Translations)

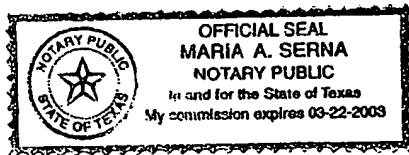
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Sworn to before me this  
9th day of October 2001.

*Maria A. Serna*

Signature, Notary Public



Stamp, Notary Public

Harris County

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